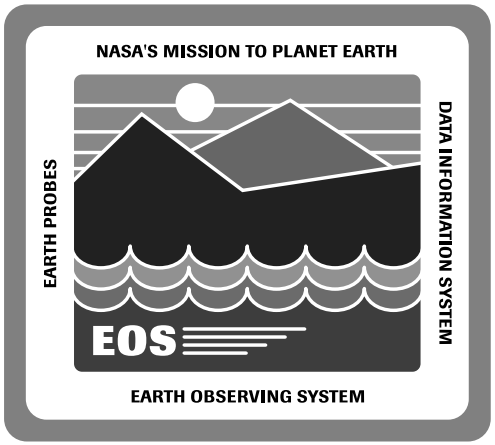
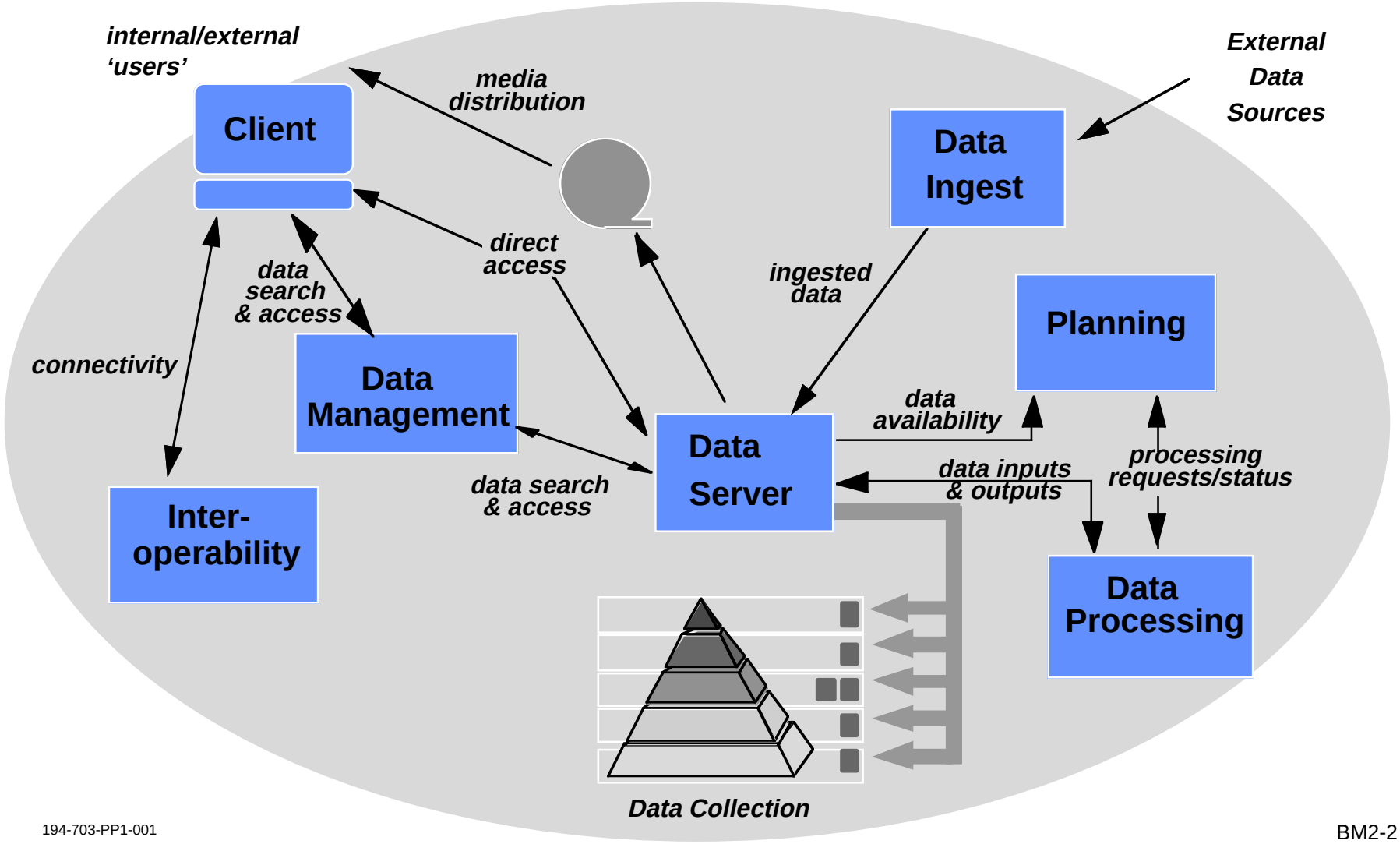


Science Data Processing Subsystems - Data Server, Client

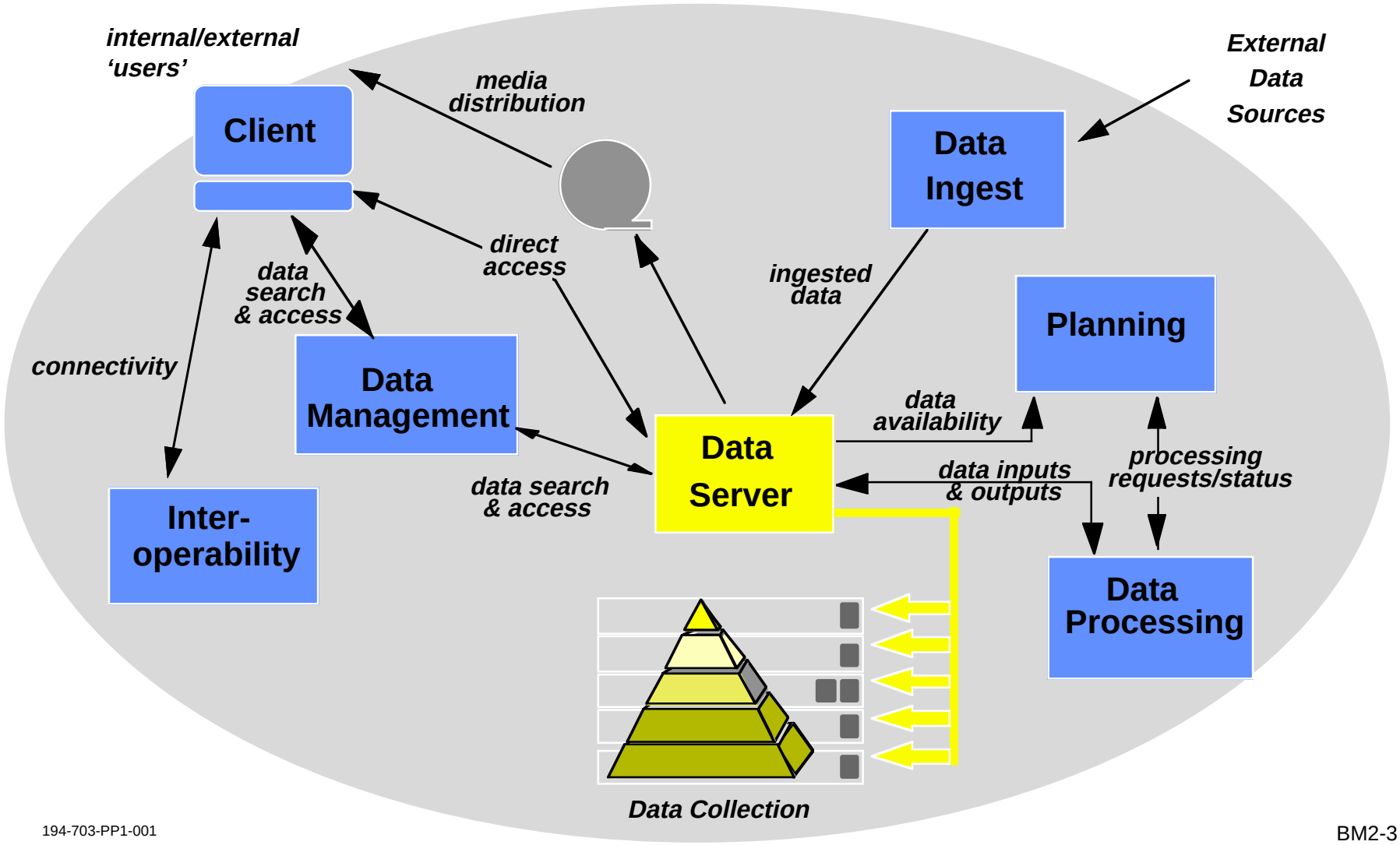
Bruce Moxon

System Design Review - 28 June 1994

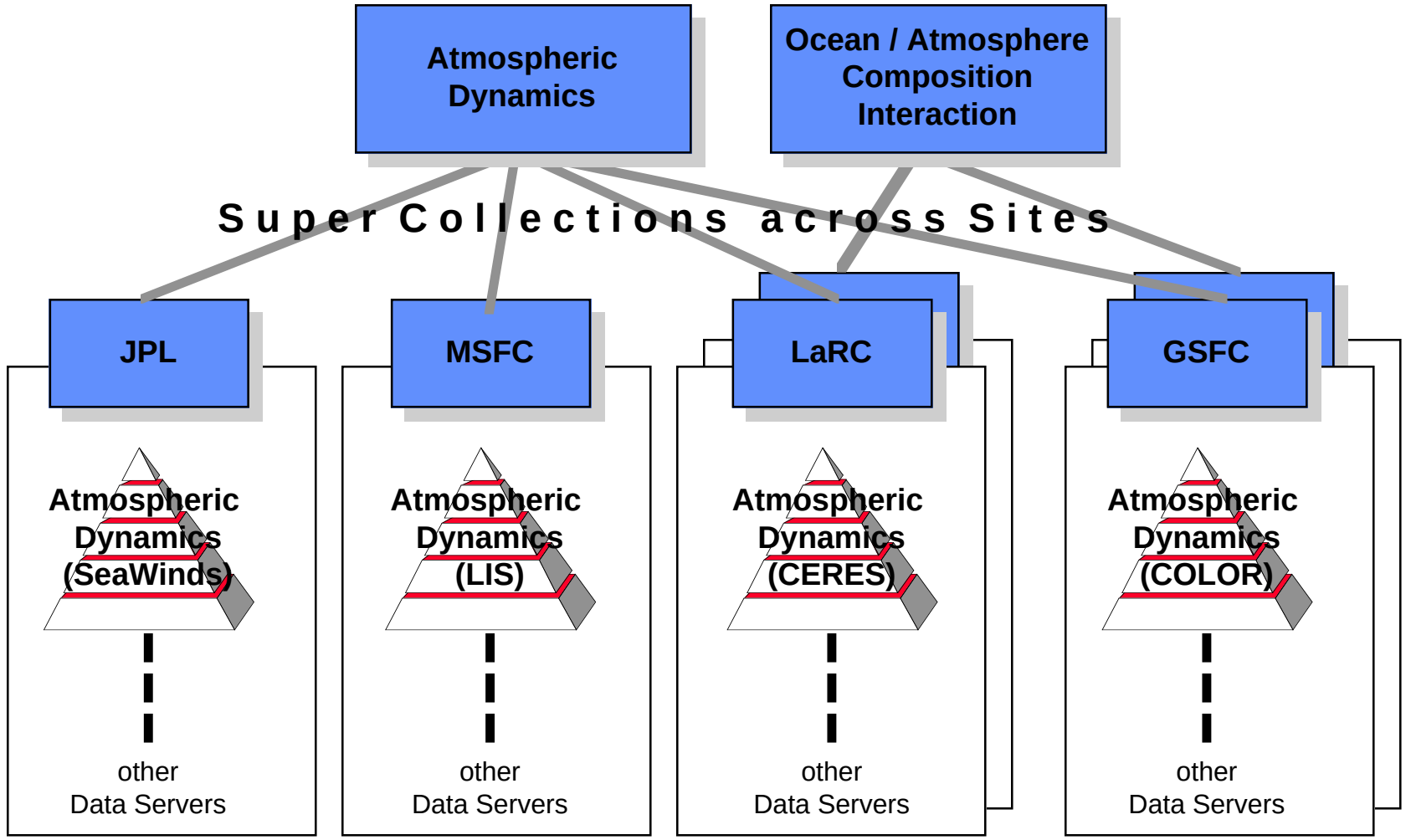
Introduction to Subsystems



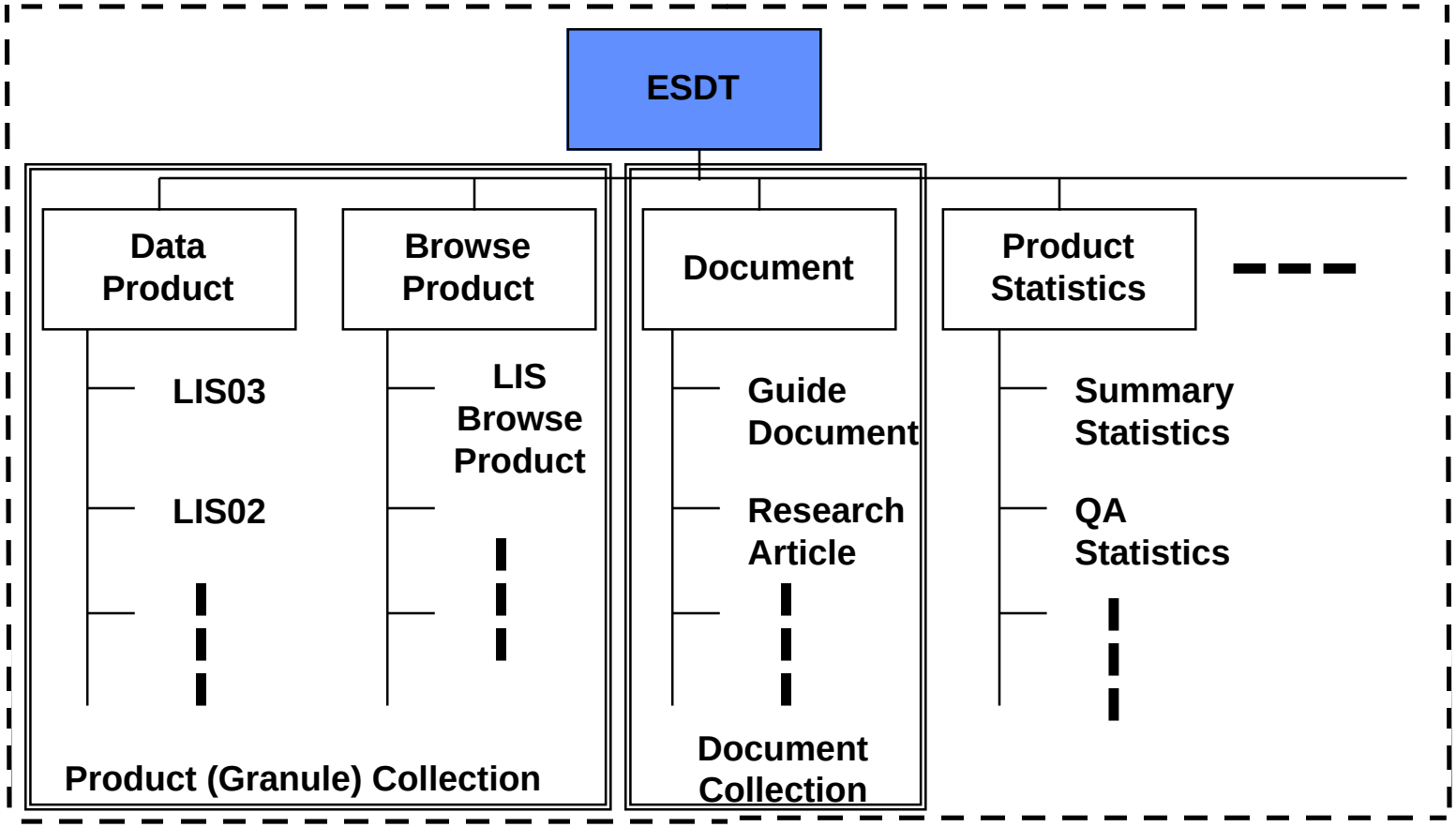
Data Server Subsystem Context



Collection Taxonomy

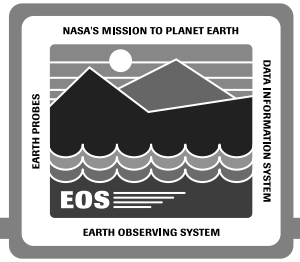


Earth Science Data Type (ESDT) Taxonomy



Logical Data Collection

Data Types and Operations



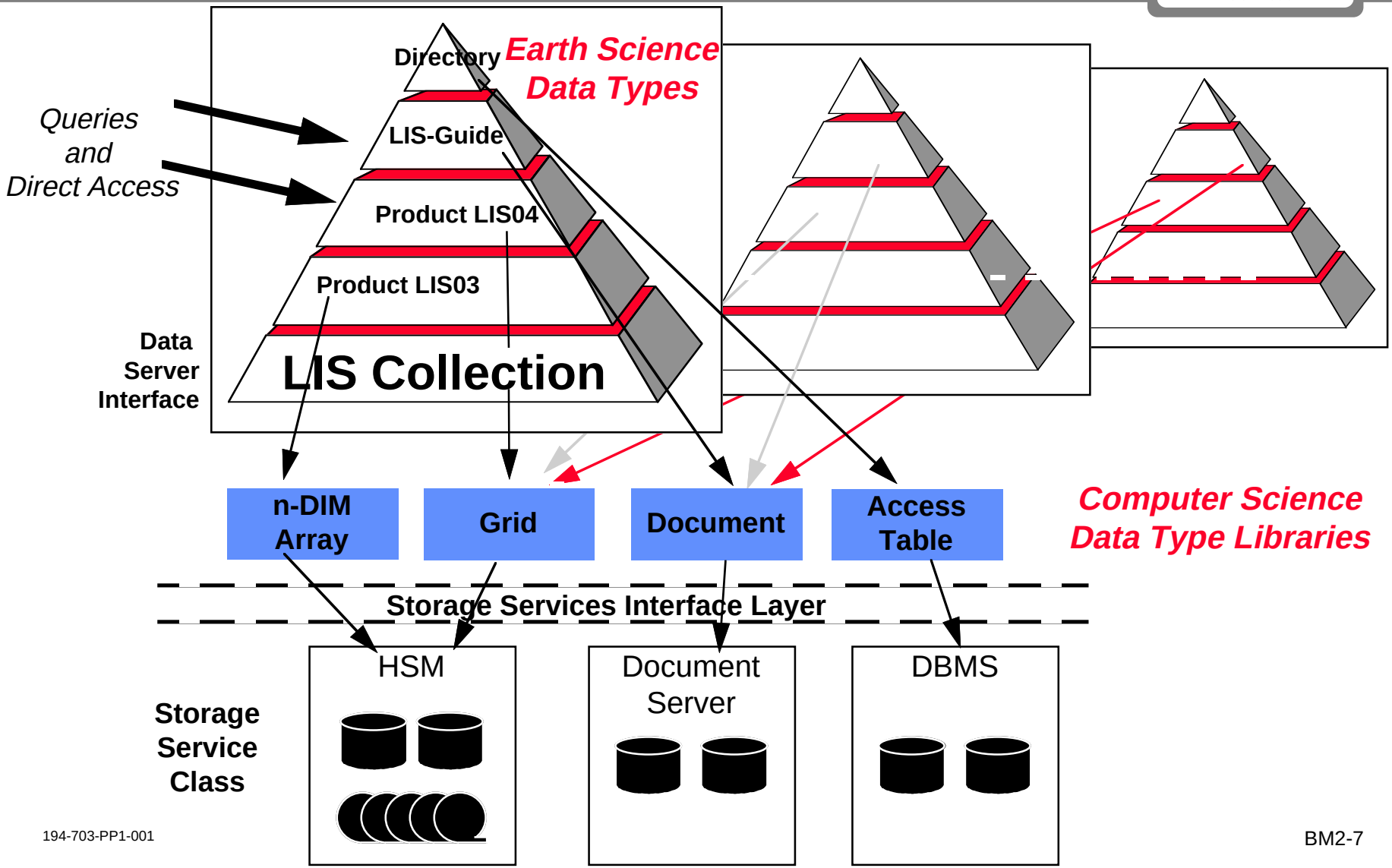
Data Model defines objects and operations

- **General Lifecycle Operations**
  - **Create, Delete, ...**
- **Instance specific operations**
  - **Attribute “accessors” (get-*)**
    - **E.g., Product: (Location, Time, Cloud Coverage, ...)**
    - **E.g., Document: (Author, Publication Date/Time, ...)**

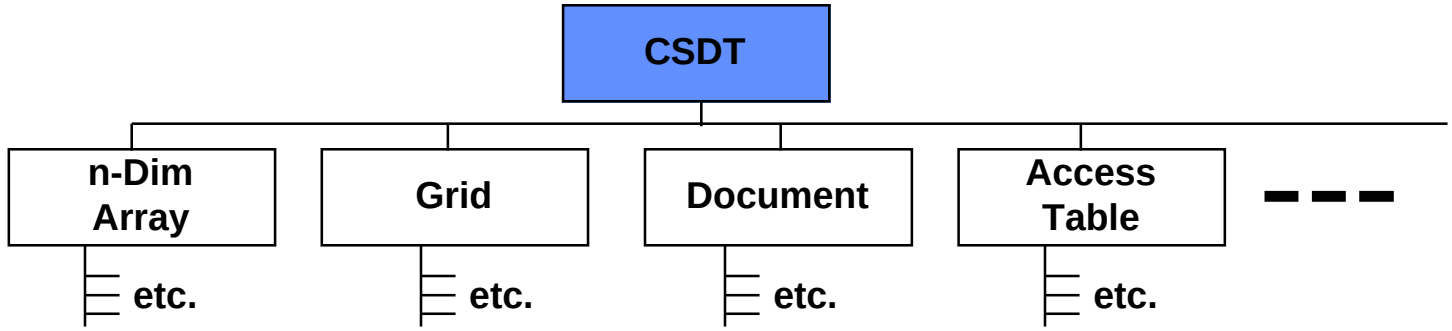
Collections defined over sets of instances

- **E.g., all instances of a type, search results set, ...**
- **Collection-general operations**
  - **Insert, Remove, Iterate_over, ...**
- **Collection-specific operations**
  - **Search, ConstructTimeSeries, ConstructAnimation**

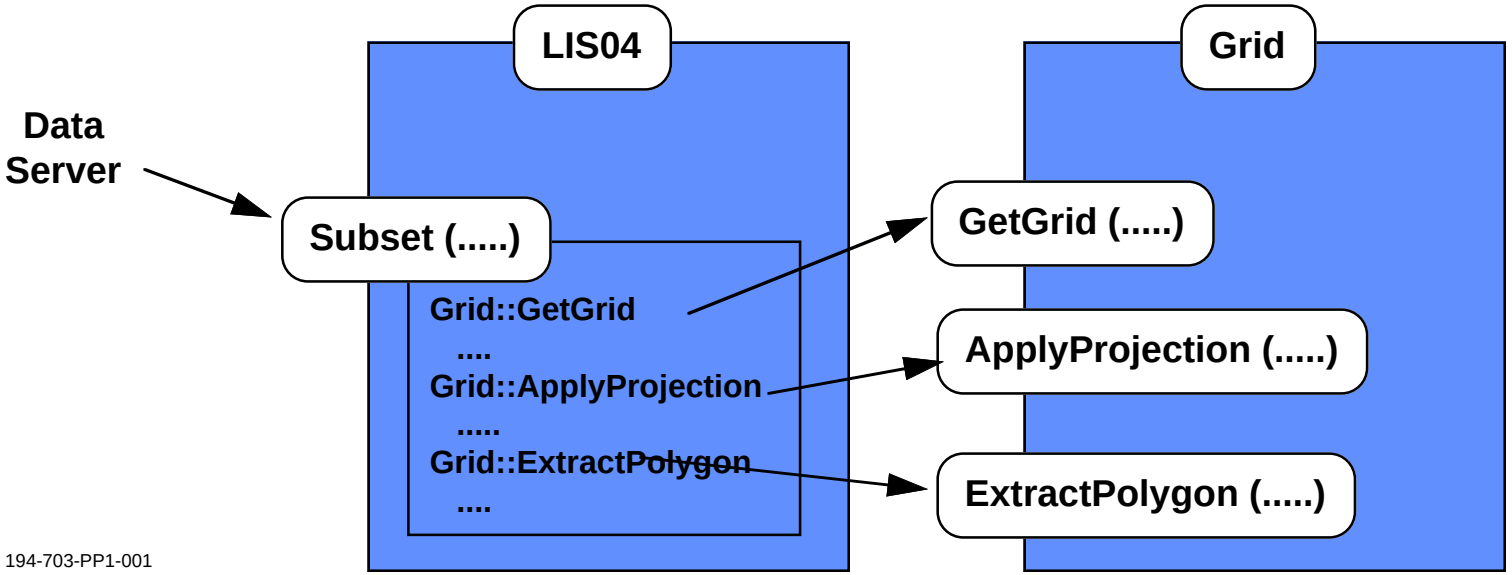
Data Server


Queries
and
Direct Access
Directory
LIS-Guide
Product LIS04
Product LIS03
LIS Collection
Earth Science
Data Types
Data
Server
Interface
n-DIM
Array
Grid
Document
Access
Table
Computer Science
Data Type Libraries
Storage Services Interface Layer
HSM
Document
Server
DBMS
Storage
Service
Class

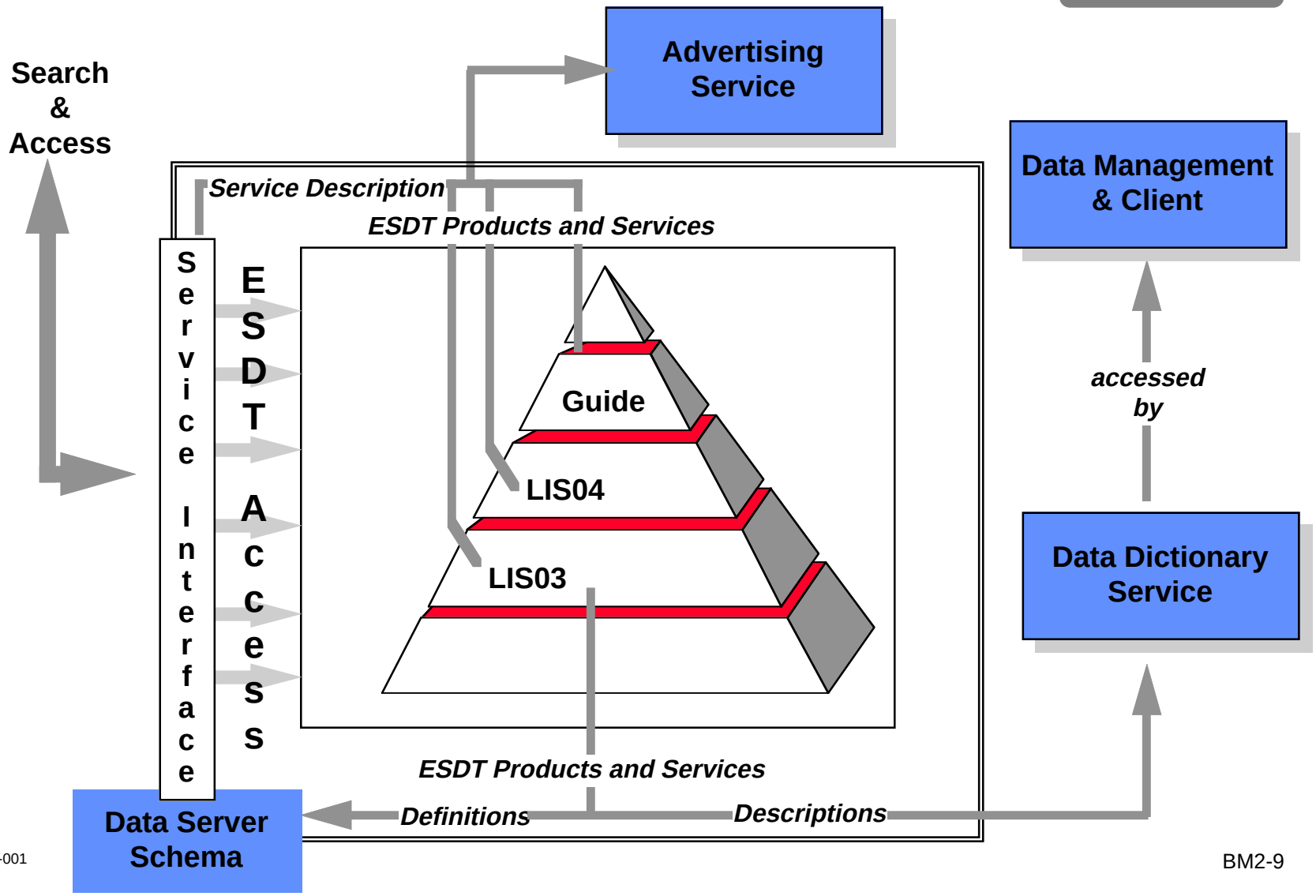
Computer Science Data Type (CSDT) Taxonomy



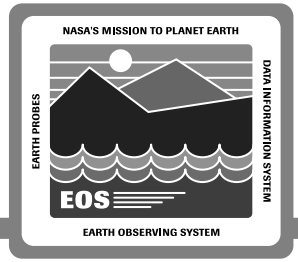
ESDT Implementation accomplished through CSDT Operations



Data Server


Search & Access
Advertising Service
Data Management & Client
Service Description
ESDT Products and Services
Service Interface
ESDT Access
Guide
LIS04
LIS03
accessed by
Data Dictionary Service
ESDT Products and Services
Definitions
Descriptions
Data Server Schema

Data Server



ESDTs provide type-specific services, for example

- **create, search, retrieve, subset, subsample**

Access to ESDT is via the *Data Server Interfaces*

- **Requests reference definitions in *Data Server Schema***
  - **e.g.: LIS04::Subset (input arguments)**
- **Schema defines services which ESDT makes available**

***Data Server Data Dictionary* provides explanation of definitions**

***Data Server Advertisement* provides general description:**

- **interface, products, services, ...**

Data Administrator provides

- **schema definition & data dictionary explanations**
- **advertisement descriptions**

***Subscriptions* support Production and Standing Order Distribution**

Data Server (cont)

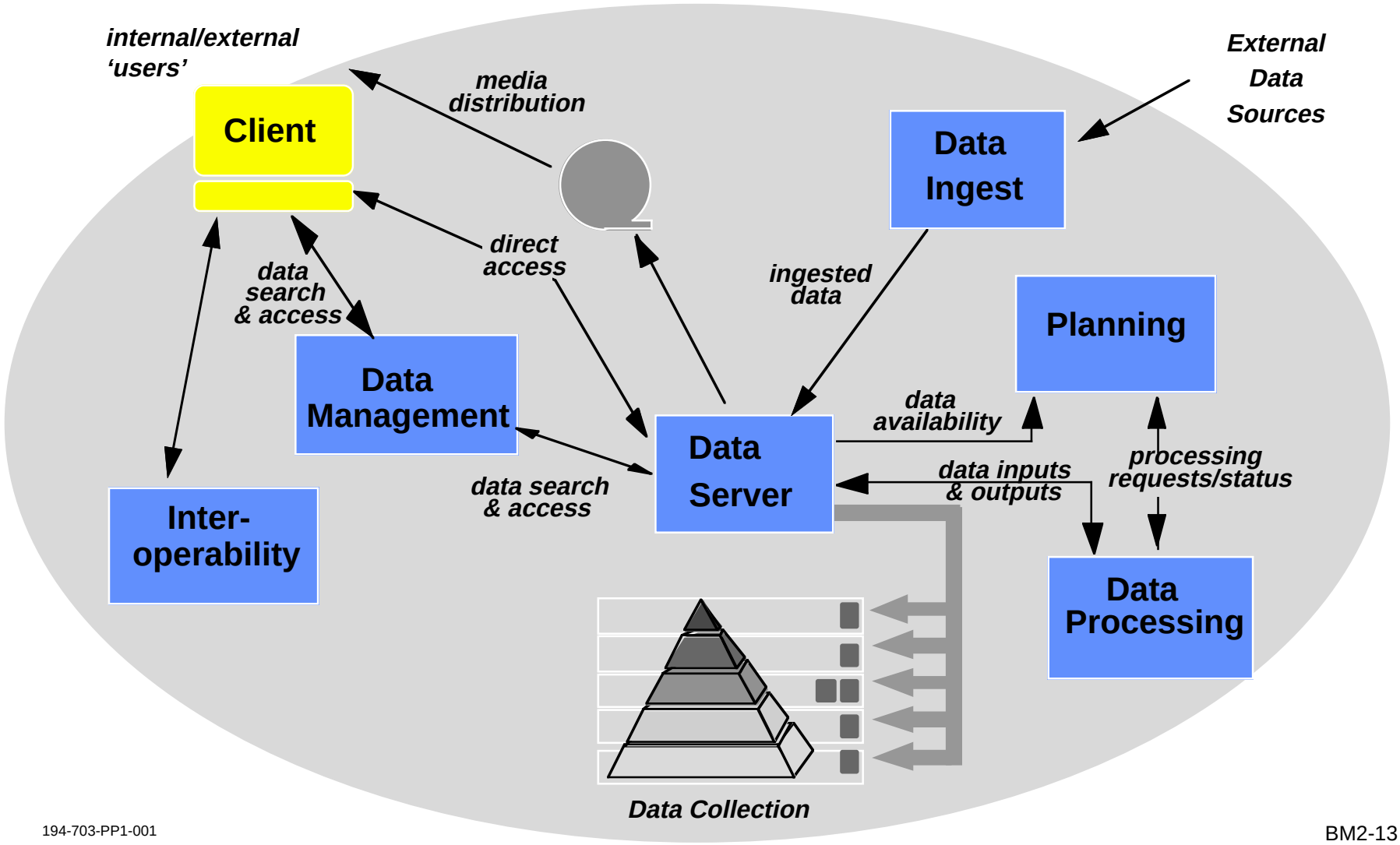
- **Designed around Earth Science data needs (ESDTs)**
- **Supports flexible data description and representation**
  - **domain specific views (“collections”)**
  - **site-specific implementations and extensions**
    - **appropriate implementation technologies (CSDTs)**
    - **optimization of compute vs. store trades**
- **Provides for system extensibility**
  - **new data types and operations**
  - **new views of existing data (evolution of collections)**
  - **new Data Providers (extended provider network)**

Data Server (cont)

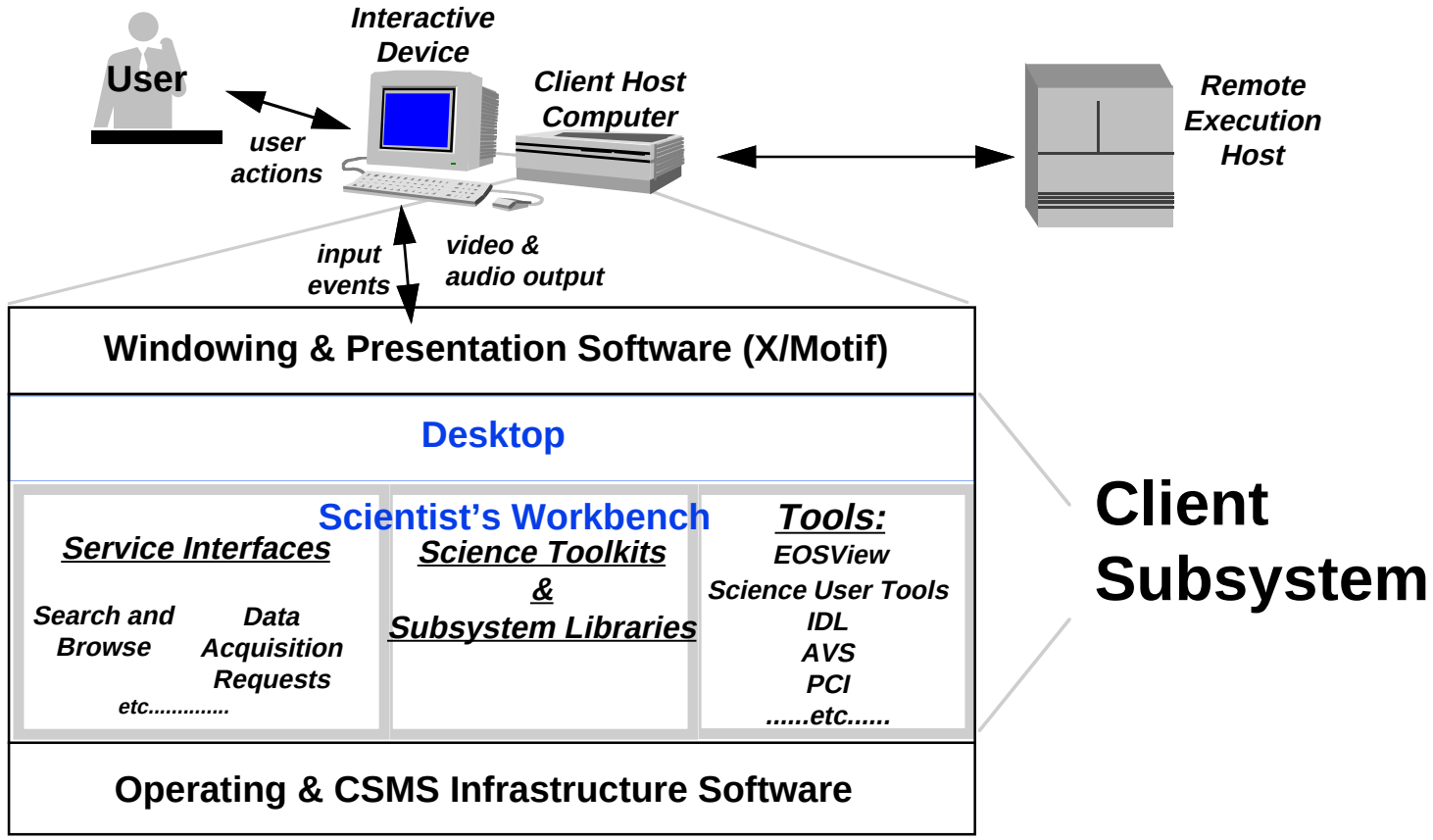
- OTS HSM software evaluations (ongoing)
- Data Compression
- OTS and Operational support for extended provider Data Servers

- Data Type Services Prototype
  - Object Oriented and Extended Relational DB Implementations
- Earth Science Data Language and Protocol
- Schema Maintenance
- Network Attached Storage
- Multi-FSMS integration
- EOSDIS (“End-to-end”) Prototype, including SCF as Data Provider

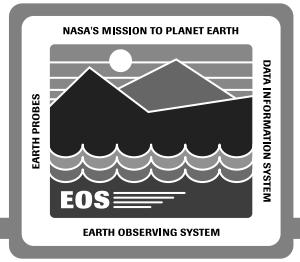
Client Subsystem Context



Client Subsystem Model



Client Subsystem



Human- and Machine- interface into ECS services

- **Data and Service Search, Access, and Invocation**
- **System operations**

Workstation *Desktop framework*

- **Container, “Document”, and Application object classes**
- **Supports desktop object descriptions through properties**
- **Provides dynamic association between objects and tools**

Extensible *Workbench* built on *Desktop framework*

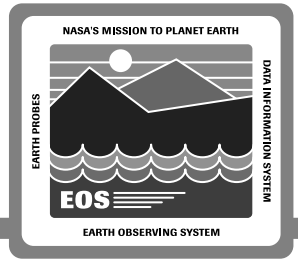
- **User interfaces to ECS services**
- **Programs to access ECS data objects (browse, view detail)**
- **Software libraries (e.g., ECS API, ingest toolkit)**

Desktop Object Classes

- ***General Desktop Object***
  - **Implements generic behavior (e.g., copy, move, etc.)**
- ***Desktop Container Objects***
  - **Provide general 'containment' behavior (e.g., insert, remove, list contents)**
  - **Example: Result Sets**
- ***Desktop "Document" Objects***
  - **Support objects with complex structure (parts, parts handlers)**
  - **Example: ECS-HDF File**
- **Desktop Application Object**
  - **Type compatible binary executables**
  - **Example: *EOSView*, an ESDT object viewer**

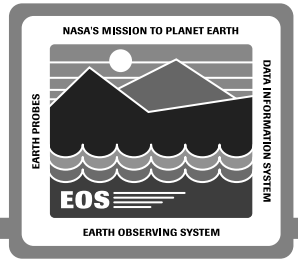
Desktop supports desktop object properties and dynamic association between objects and tools

Client Subsystem: Key Operations Concepts



- **Documents- and applications-based object interactions**
  - **Document "bound" to default object-type application**
  - **Additional compatible applications may be invoked (desktop user methods)**
- **Sessions (DataServer) support an extended object space**
- **User registration and request mediation handled through client objects and callbacks**
- **Subscription interface (Data Server) supports standing orders for both human review and automated processing**
- **Scientist's Workbench supports customization and extension**
  - **Location and installation of desired ECS services**
  - **Integration of OTS tools and appropriate object type translation and import/export tools**
- **Collaboration support through human readable "handles" to shared session and data objects**

Client Subsystem (cont)



- **Object-based desktop environment consistent with evolving standards**
  - **Enhances possibility for cross-platform client support**
  - **Leverages significant vendor COTS efforts**
- **Support for custom interfaces into various ECS services**
  - **domain specific views**
  - **well matched to user expertise and interests**
- **Extensible Workbench for custom and COTS tool integration**
  - **“desktop” user methods**
  - **data translation services required for COTS tool use**

Client Subsystem (cont)

- **COTS Desktop Environment support**
- **CHUI functionality requirements**
- **Session semantics and participants' roles and responsibilities**

- **EOSDIS ("End-to-end") Prototype**
  - **Client desktop environment**
  - **Integration of COTS tools**